



Integrated Functional Appraisal (IFA)

Chemical Sciences Division

Performance Year 2003

(July, 2002 - June, 2003)



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Executive Summary

The triennial Integrated Functional Appraisal of the Chemical Sciences Division was conducted by LBNL Environment, Health and Safety during late winter and spring, 2003. The IFA team consisted of individuals having technical expertise in the wide variety of activities in which the Division engages. Particular emphasis was placed on examination of the various Formal Authorizations held by researchers in the Division. Division spaces were also inspected to locate and correct hazards.

Formal Authorizations held by the Division were up to date and fully authorized. Chemical Sciences has a robust system in place that assures that its researchers maintain their Formal Authorizations.

Inspections showed that for the most part CSD spaces have been maintained with a minimum of hazards present. Several findings were found connected with one research group. This group had recently relocated from a major teaching university and was not familiar with how safety is managed at LBNL. As the group acquires more familiarity with LBNL systems it is anticipated that its performance will be consistent with the rest of the Division.

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1.0 Introduction

1.1 IFA Purpose

The Integrated Functional Appraisal (IFA) is a key component of Lawrence Berkeley National Laboratory's Integrated Safety Management (ISM) system. It is part of Core Function #5 (Continuous Improvement) of the ISM concept, and forms one of the three tiers of the Laboratory's safety assessment program that evaluates the ongoing effectiveness of Divisions' Integrated Safety Management programs. LBNL's Environment, Health and Safety (ESH) Division has been conducting IFA's of all laboratory organizations since 1996, with each organization reviewed every three years. The Chemical Sciences Division's last IFA was conducted during Performance Year 2000.

1.2 Scope

The 2003 Integrated Functional Appraisal of the Chemical Sciences Division consisted of the following elements:

- Identifying of all spaces being utilized for Chemical Sciences operations as of the time of the Appraisal. This was done by downloading a list of spaces assigned to the Chemical Sciences Division from the LBNL Space database.
- Determining the basic operations (laboratory, shop, office, other) being conducted in each space assigned to MSD.
- Reviewing the status of compliance of all operations in MSD that require formal authorizations. These formal authorizations include Satellite Accumulation Areas (SAA) for hazardous waste, Radiological Work Authorizations (RWA), Radiological Work Permits (RWP), Sealed Source Authorizations (SSA), X-Ray Authorizations (XRA), Biological Use Authorizations (BUA), and Activity Hazard Documents (AHD).
- Inspecting of all technical spaces (laboratory and shop) and a representative number of non-technical spaces, for purpose of identifying and correcting hazards.

2.0 Appraisal Process

2.1 Team

Team members were selected based upon the technical abilities required to properly assess the hazards present in MSD operations.

- John Seabury was the EH&S Division Liaison assigned to the Chemical Sciences Division through June, 2003 and was the team leader. He also supplied industrial hygiene and safety engineering expertise during the inspections.
- Dawn Banghart is the EH&S Health Physicist assigned to the Chemical Sciences Division, and assumed responsibility as EH&S Division Liaison on July 1, 2003.
- Ted Decastro is LBNL's Laser Safety Officer and is also the supervisor of the X-Ray Safety Program. Chemical Sciences has a number of laser users and two X-Ray machines.
- Connie Grondona, RN is LBNL's Principal Occupational Health Nurse.
- Katherine Johnescu is the Department of Energy, Berkeley Site Office Program Representative for Basic Energy Sciences.
- Michael Prior is Chemical Sciences Division Deputy Director.
- Wayne Lukens is a senior researcher in Chemical Sciences, and serves to coordinate safety issues throughout the Glenn T. Seaborg Center (a major component of CSD's operations at LBNL).

The composition of the team on any given day of inspections and/or reviews depended upon the activities scheduled for that day. Team members primarily evaluated areas within their expertise. Mr. Seabury, Ms. Banghart and Dr. Prior were present during all inspections.

2.2 Defining Appraisal Areas

Review of Operations under Formal Authorization

Chemical Sciences has several types of formal authorizations: Satellite Accumulation Areas (SAA) for chemical, radioactive and/or mixed waste; Radiological Work Authorizations (RWA); X-Ray Authorizations (XRA); Animal Use Protocols (AUP); Biological Use Registrations (BUR); and Activity Hazard Documents (AHD). All but AHD have audit or reauthorization processes in which EH&S and/or an external review committee is intimately involved. Activity Hazard Documents are initially authorized with significant EH&S input, but are reauthorized at the sole discretion of the Division.

For SAA, RWA, SSA, XRA, AUP and BUA the most recent audit or reauthorization reports prepared by the EH&S Subject Matter Expert were reviewed by the IFA Team Leader and discussed with the SME.

Activity Hazard Document review was conducted by IFA team members according to the team members' technical expertise. AHD review included the following items:

- Content: Did the researcher and EH&S have copies of the AHD and amendments?
- Initial Authorization: Did the researcher have access to the fully-signed signature page indicating that the work had been fully authorized? Did EH&S have a copy of the signature page?
- Reauthorization: Was there a reauthorization signed by the Division Director at annual intervals, and did that reauthorization contain a statement indicating that there had been no changes in the AHD? Did the Division provide copies of the reauthorization to EH&S?
- Work Review: Was the work being performed consistent with the work that is authorized in the AHD? Are all individuals working on the project listed on the AHD and is their training current? Do the individuals know the contents of the AHD?

Space Inspection

All spaces (technical and non-technical) assigned to Chemical Sciences were inspected as part of the Integrated Functional Appraisal. A list of the spaces inspected is included in the Appendices.

Schedule

The IFA was formally begun on 20 February, 2003. Records review was begun immediately thereafter and continued through June, 2003. Field inspections and AHD reviews were begun in late February, 2003 and continued through June, 2003.

3.0 Findings, Discussion and Recommendations

3.1 Formal Work Authorizations

Formal Work Authorizations are listed in Appendix A.

Satellite Accumulation Areas

Chemical Sciences' Satellite Accumulation Areas include areas for chemical, radioactive, and mixed chemical/radioactive waste. A total of 124 SAA audits for compliance with LBNL requirements were conducted during Performance Year 2003. Compliance for the quarterly inspections was as follows:

Satellite Accumulation Area Compliance	
Quarter	Compliance
1 st (July-September 2002)	100%
2 nd (October-December 2002)	100%
3 rd (January-March 2003)	100%
4 th (April-June 2003)	100%
Overall	100%

These numbers are self-explanatory: Chemical Sciences has excellent control over its chemical, radioactive and mixed waste Satellite Accumulation Areas.

Radiological Work Authorizations

Chemical Sciences has seven Radiological Work Authorizations. The bulk of the work is located in Building 70A, with storage of high level sources in the Pit Room in Building 70. Minor work is also performed in Building 74 (Cobalt-60 irradiator, animal colony). These authorizations are audited on a regular 18-month cycle. RWAs were audited in 2002 and 2003 with no deficiencies.

Chemical Sciences does not have any Sealed Source Authorizations (SSA)¹. There are sealed sources that are included in Radiological Work Authorizations, and these are checked for leakage at the time of renewal of the RWA.

In July, 2002 there was an Occurrence Report relating to radiological materials. A piece of scientific equipment contaminated with Californium-249 was found in a hallway cabinet, outside of a Controlled Area. It is likely that this equipment had been in this location for up to 30 years. For the last several years the Chemical Sciences Division has had an ongoing program of locating, characterizing and disposing of legacy radioactive materials. It is unfortunate that this material was found outside of a Controlled Area; however the fact that it was located is testament to the ongoing positive efforts to find and resolve problems created by others in the past.

¹ Chemical Sciences did open a SSA in June, 2004 for sources stored in Building 10 and used on a beamline at the Advanced Light Source. However, this SSA is outside of the time period for this review.

X-Ray Authorizations

Chemical Sciences has two X-Ray sources, both of which are properly authorized. Both sources are inactive and have been for several years.

Animal Use Protocols

Chemical Sciences has two Animal Use Protocols for experiments involving mice. The mice are kept in the B74 animal colony and the experiments are conducted in B70A. Renewals of these protocols were originally scheduled for September 2003 but were delayed until November 2003 because the Principal Investigator was traveling. There was an extension requested to cover the delay in submitting the formal renewal request. The Animal Use and Care Committee was aware of this slight delay in renewal and approved the extension.

Biological Use Authorizations/Registrations

Biological work is reviewed and approved by line management and the Institutional Biosafety Committee. Biological work that requires Biosafety Level 2 containment requires a Biological Use Authorization (BUA), which is a formal authorization and is renewed annually. Biological Use Registrations (BUR) are developed for Biosafety Level 1 work, are not formal authorizations, and are not renewed or reviewed unless the work changes.

Chemical Sciences has one Biological Use Registration and no Biological Use Authorizations. This BUR was originally approved by the Institutional Biosafety Committee in July 2002.

Activity Hazard Documents

Chemical Sciences Division has 11 Activity Hazard Documents. No discrepancies were noted during AHD review. Chemical Sciences has a proactive program to have each researcher perform an annual review of his/her AHD during late spring. The Division is also quite proactive in informing EH&S of any changes to the activities during the year.

3.2 Line Management ('Self-Authorization') Space/Operations

Technical (laboratory, shop) and non-technical (office, conference, storage, etc.) spaces evaluated are listed in Appendix B. All spaces assigned to Chemical Sciences Division were inspected.² There were 29 findings during this IFA,

² Chemical Sciences also has activities in Building 70 (Pit Room storage of high-level radioactive sources) and Building 74 (animal colony; Co-60 irradiator). These spaces are assigned to Environment, Health and Safety and Life Sciences, respectively and were not evaluated during this IFA.

compared with 19 findings during the 2000 IFA. Findings arising from the evaluations are listed in Appendix C.

1. *New Research Group:* A significant number of findings during these inspections were found in recently-renovated spaces occupied by a new research group. The Team feels that this probably reflects the group's unfamiliarity with how safety is managed at LBNL, but does not necessarily reflect any lack of safety-consciousness on the part of that group. We suggest that the group continue to consult closely with the Division safety staff, and with EH&S directly as necessary, to assure that it develops the culture of safety management that extends across the Hill.
2. *CSD Researchers at UC Berkeley:* A significant proportion of the Chemical Sciences Division researchers are physically housed at the University of California, Berkeley campus. At present, Chemical Sciences Division staff (including students) located at UCB are not specifically included in the Division's Integrated Safety Management Plan. Over the next performance year 2004 there will be a Hill-wide effort to recognize LBNL and DOE responsibility for safety in DOE-funded projects, wherever they may be executed (including at UCB). The Chemical Sciences Division should begin thinking how it will accomplish this so that as new LBNL expectations are rolled out it is in a position to respond.

4.0 Noteworthy Practices

1. *Access, Egress and General Housekeeping:* Access, egress and housekeeping are in general well maintained in Chemical Sciences Division spaces. While the density of gloveboxes in the HERL facility is high, users have developed methods of scheduling work so that they do not "trip over" each other, and safety is well maintained.
2. *Management Support:* There is excellent management support of the safety program within CSD, as evidenced by the regular safety meetings between the Division Liaison, Division Safety Coordinator, and Division Deputy. In addition, the Division Deputy attended all IFA inspections, and actively participates in reviewing compliance records and following up on needed modifications.
3. *Legacy Radioactive Materials:* Over the last several years there has been an ongoing project to locate, identify, and dispose of legacy radioactive materials connected with the Actinide Chemistry programs. While this project resulted in discovery of conditions not in compliance with DOE requirements (which resulted in an Occurrence Report this performance period), this should be viewed positively as an active effort to identify and resolve issues proactively. As a result of this ongoing legacy

materials project, the Division and LBNL have assurance that there are no "surprises" waiting in this area.

5.0 Conclusions

The Chemical Sciences Division has a very well developed safety program as demonstrated by the relatively low number and severity of findings. Its formal authorizations are all up to date and comply with requirements. Management and administrative support are excellent. A number of findings occurred in one research group; this group had relatively recently arrived at LBNL and was unfamiliar with how safety is managed at LBNL as opposed to the large teaching campus from which they transferred.

A large segment of researchers holding appointments in Chemical Sciences have their research programs physically located at UC Berkeley. Over the next few years the relationship between UC Berkeley and LBNL for safety issues will change in accordance with the Partnership Agreement being negotiated; it is likely that UCB researchers receiving LBNL support will be more accountable to LBNL for the safety programs in their laboratories. Chemical Sciences should begin thinking how it will deal with these redefined requirements as it plans for the future.

Appendix A Formal Authorizations

Type of Formal Authorization	Identification Number	Building	Room
Satellite Accumulation Area (SAA) (February, 2003 audit)	n/a	002	0321A
			0331
			0333
			0355A
		006	2233
		010	0118
		071	0101
			0226
		070A	1129 (2 SAAs)
			1145 (5 SAAs)
			1149 (3 SAAs)
			1151
			1165
			2203
			2205
			2211 (3 SAAs)
			2217
			2229 (4 SAAs)
Radiological Work Authorizations (RWA)	1107	006	1000 (BL 7.0, 8.0, 10.3.1, 10.0)
	1020	070	0147A
		070A	1129, 1145, 1145A, 1149, 1151, 1159A, 1159B, 1165, 1165A
	1027	070A	2211, 2215,

Type of Formal Authorization	Identification Number	Building	Room
			2217B, 2217
	1040	070A	2011, 2229A, 2229B
	1112	070	0147A
		070A	1129, 1145, 1149, 1151, 1159A, 1159B
		074	0144A
	1113	070A	1145, 1145B, 1151, 1159A, 1159B, 2211, 2215, 2217
		074	144A
		075	0106
	1117	070	147A
		070A	1129, 1145, 1145A, 1145B, 1149, 1165, 1165A
X-Ray Authorizations	70A-1145-1	070A	1145
	70A-1159-1		1159
Animal Use Protocols	1703	070A	2229A, 2229B
		074	Animal Colony
	1704	070A	2229A, 2229B
		074	Animal Colony
Biological Use Authorizations and Registrations	B091-071102 (BUR, BL 1)	006	1000 (BL 1.4.3)

Type of Formal Authorization	Identification Number	Building	Room
Activity Hazard Documents (AHD)	2056	002	0321A
	2060	002	0333
	BE1012	006	1000 (BL 9.0.2)
	2001	006	1000 (BL 9.0.2)
	2044	006	1000 (BL 9.0.2)
		010	0118
	GS1032	010	0118
	2048	070	2211, 2217
	2026	070	2211, 2217
	2027	070	2211, 2217
	186	071	0117
	2050	002	0448,0458
		006	1000 (BL 5.3.1)

Appendix B Spaces Inspected

Building	Room
002	0300B
	0300C
	0302
	0305
	0307A
	0311
	0313
	0317
	0319
	0321A
	0321B
	0329
	0331
	0333
	0333A
	0337
	0355A
	0448
	0458
006	2203
	2203
	2214
	2216
	2218
	2222
	2203A

Building	Room
010	0118
070A	1129
	1145
	1145A
	1145B
	1149
	1150A
	1151
	1152
	1154
	1156
	1158
	1159A
	1159B
	1160
	1161A
	1161B
	1165
	1165A
	2203
	2205
	2211
	2215
	2217
	2217B
	2223
	2229A
	2229B
	2229C

Building	Room
	2229D
	2255A
	2255B
	2255C
	2255F
	2255G
	2255H
071	0117
071G	0101
	0103

Appendix C Inspection Findings

Building	Room	Finding	Action
002	0302	Lateral file requires seismic restraint	Restrain lateral file.
	0317	Bookshelf requires seismic restraint	Secure bookshelf.
	0319	Bookcase requires seismic restraint	Secure bookcase
	0321A	Storage cabinets require seismic restraint	Restrain cabinets
	0321B	Absorbent required to handle leaks from oil-filled pumps.	Order absorbent socks; recommend SKM210 PIG® Oil-Only Absorbent Socks from http://www.newpig.com/en_US/main.jhtml
	0329	File cabinet near the door requires seismic restraint.	Restrain file cabinet.
	0331	Storage cabinet requires seismic restraint	Restrain cabinet
	0333A	Absorbent required to handle leaks from oil-filled pumps.	Order absorbent socks; recommend SKM210 PIG® Oil-Only Absorbent Socks from http://www.newpig.com/en_US/main.jhtml
	0337	Overhead storage of stuff over sink poses a hazard	Remove stuff from over sink.
	0355A	Electrical panel is blocked	Clear space around electrical panel: width of panel, 36" in front of the panel, full height floor-ceiling
		Optics storage cabinet must be seismically restrained	Restrain cabinet
006	2214	Bookcase requires seismic restraint	Restrain bookcase
010	0118	Large cryogen dewars require seismic restraint	Restrain dewars
070A	1129	Northeast corner of the lab, material on cabinet requires seismic restraint	Restrain materials

Building	Room	Finding	Action
		Eyewash and safety shower were last tested 9/5/02	Inventory all EWSS that are behind card-access doors, contact John Seabury to transmit that list to Facilities to put these EWSS on "restricted area" testing program.
	1145	Eyewash and safety shower were last tested 9/5/02	Inventory all EWSS that are behind card-access doors, contact John Seabury to transmit that list to Facilities to put these EWSS on "restricted area" testing program
	1150A	There is a heavy item on a bookcase that must be either removed or seismically restrained	Either remove the item or seismically restrain it.
	1156	Boxes on the floor block the exit.	Move the boxes.
	1159A	Quantum Design "SQUID" needs to be seismically restrained.	Restrain the unit.
		Laser Printer and table need to be seismically restrained.	Restrain the units.
	1159B	Incompatible containers stored in the same secondary containment: nitric acid vs. sodium hydroxide and sodium bicarbonate	Separate incompatible materials, store in secondary containment only with compatibles.
		Radioactive waste was in the proper container but the "start date" was not filled out on the tag.	Assure that waste handling is in accordance with LBNL requirements.
	1160	Bookcase partially blocks the exit	Move the bookcase.
	1165A	Electrical Panel #PNL-055-70A was blocked by a printer	Move the printer.
		Overhead storage of "all-thread" is a hazard	Secure or move the material.
071G	2211	The inert gas cylinders that supply the Barney and Pandora gloveboxes require a pressure relief valve	Install proper pressure relief valve.
	2255C	Bookcases require seismic restraint for contents.	Install lips or chains to secure contents into bookcase.
	0101	Electronics rack requires seismic restraint	Restrain electronics rack
		Bookcase requires seismic restraint	Restrain bookcase